

1 What is claimed:

2 1. An epicyclic cross piston engine comprising:

3 a #1 cylinder, a #2 cylinder, a #3 cylinder and a #4 cylinder and they each have a
4 cylindrical bore;

5 a #1 cylindrical piston, a #2 cylindrical piston, a #3 cylindrical piston and a #4 cylindrical
6 piston and they each have a top surface and a bottom end;

7 an elongated master connecting rod having a top end, a bottom end and a longitudinally
8 extending Y-axis;

9 first connection means connecting said top end of said master connecting rod to said
10 bottom end of said #1 cylindrical piston; said #1 cylindrical piston being telescopically received
11 in said bottom end of said #1 cylinder for reciprocal travel;

12 second connection means connecting said bottom end of said master connecting rod to
13 said bottom end of said #3 cylindrical piston; said #3 cylindrical piston being telescopically
14 received in said bottom end of said #3 cylinder for reciprocal travel;

15 an elongated secondary connecting rod having a front end, a rear end and a longitudinally
16 extending X-axis;

17 third connecting means connecting said top end of said secondary connecting rod to said
18 bottom end of said #2 cylindrical piston; said #2 cylindrical piston being telescopically received
19 in said bottom end of said #2 cylinder for reciprocal travel;

20 fourth connection means connecting said bottom end of said secondary connecting rod to
21 said bottom end of said #4 cylindrical piston; said #4 cylindrical piston being telescopically

1 received in said bottom end of said #4 cylinder for reciprocal travel;

2 an elongated output shaft having a front end, a rear end and a longitudinally extending Z-
3 axis;

4 said Z-axis is oriented perpendicular to both said both X-axis and said Y-axis; said X-axis
5 and said Y-axis lie in separate parallel planes perpendicular to said Z-axis and said separate
6 parallel planes are longitudinally spaced from each other a predetermined distance J along said
7 Z-axis; said X-axis and said Y-axis are oriented substantially ninety degrees to each other when
8 looking along said Z-axis; and

9 drive train means connecting said master connecting rod and said secondary connecting
10 rod to said output shaft that produces 360 degree rotation in said output shaft as a result of a
11 complete reciprocal travel cycle of each of said pistons in their respective cylinders.

12 2. An epicyclic cross piston engine as recited in claim 1 wherein said drive train means
13 comprises an elongated bellcrank coordinating arm connected between said secondary
14 connecting rod and said master connecting rod.

15 3. An epicyclic cross piston engine as recited in claim 1 wherein said drive train means
16 comprises a bellcrank output arm connected between said master connecting rod and said output
17 shaft.

18 4. An epicyclic cross piston engine as recited in claim 3 wherein said drive train means
19 further comprises a driveshaft link connected between said bellcrank output arm and said output
20 shaft.

1 5. An epicyclic cross piston engine as recited in claim 2 wherein said secondary
2 connecting rod has a transversely extending #1 bore hole having an A-axis located at a midlength
3 point of said secondary connecting rod.

4 6. An epicyclic cross piston engine as recited in claim 5 wherein said drive train means
5 further comprises a #1 connecting pin having a front end, a rear end and a longitudinal axis
6 aligned with said A-axis; said front end of #1 connecting pin being journaled in said #1 bore hole
7 of said secondary connecting rod.

8 7. An epicyclic cross piston engine as recited in claim 6 wherein said rear end of said #1
9 pin is rigidly connected to said bellcrank coordinating arm.

10 8. An epicyclic cross piston engine as recited in claim 6 wherein said master connecting
11 rod has a transversely extending #2 bore hole having a B-axis located at a midlength point of said
12 bellcrank output arm.

13 9. An epicyclic cross piston engine as recited in claim 8 wherein said drive train means
14 further comprises a #2 connecting pin having a front end, a rear end, and a longitudinal axis
15 aligned with said B-axis; said #2 connecting pin being journaled in said #2 bore hole of said
16 master connecting rod.

17 10. An epicyclic cross piston engine as recited in claim 9 wherein said drive train means
18 further comprises a bellcrank output arm connected between said master connecting rod and said
19 output shaft.

20 11. An epicyclic cross piston engine as recited in claim 10 wherein said front end of said
21 #2 connecting pin is rigidly connected to said bellcrank coordinating arm.

1 12. An epicyclic cross piston engine as recited in claim 11 wherein said rear end of said
2 #2 connecting pin is rigidly connected to said bellcrank output arm.

3 13. An epicyclic cross piston engine as recited in claim 12 wherein said B-axis is located
4 a predetermined distance E from said A-axis.

5 14. An epicyclic cross piston engine as recited in claim 13 wherein said bellcrank output
6 arm has a transversely extending #3 bore hole having a C-axis that is parallel to said B-axis and
7 said distance between said B-axis and said C-axis is $\frac{1}{2}$ E.

8 15. An epicyclic cross piston engine as recited in claim 14 wherein said drive train means
9 further comprises a #3 connecting pin having a front end, a rear end and a longitudinal axis
10 aligned with said C-axis; said front end of said #3 connecting pin being journaled in said #3 bore
11 hole of said bellcrank output arm.

12 16. An epicyclic cross piston engine as recited in claim 15 wherein said drive train means
13 further comprises an elongated driveshaft link and said rear end of said #3 connecting pin is
14 rigidly connected to said driveshaft link.

15 17. An epicyclic cross piston engine as recited in claim 16 wherein said rear end of said
16 output shaft is rigidly connected to said driveshaft link along said Z-axis.

17 18. An epicyclic cross piston engine as recited in claim 17 wherein the distance between
18 said C-axis and said A-axis is F and F is equal to $\frac{1}{2}$ E.